Clear Lake Nutrient TMDL

Lori Webber

Central Valley Regional Water Quality Control Board

Regulatory Framework

- Clean Water Act and Porter Cologne
- Basin Plan
  - Assigns Beneficial Uses
  - Water quality objectives
  - Implementation program
- Basin Plan Amendment
- 303(d) List of Impaired waterbodies
  - TMDL Required

What is a TMDL?

- Total Maximum Daily Load
- The amount of pollutant that a waterbody can accept and still meet its beneficial uses.

Beneficial Uses of Clear Lake

- MUN
- Agriculture
  - Irrigation
  - Stock Watering
- Recreation
  - REC-1
  - REC-2
- Freshwater Habitat
  - WARM
  - COLD (Potential)
- Spawning
  - SPWN (Warm)
- WILD
- COMM

Narrative standard

- Basin Plan states: "*water shall not contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses*"

Clear Lake is “Impaired”

- Scum-forming blue-green algae blooms
- Beneficial uses not achieved
- 303(d) listed
- TMDL Required

Cause of Impairment?

- Clear Lake is naturally “eutrophic”
- Historical accounts suggest that the algae problem has worsened since the 1920’s and 1930’s
- Algae need the nutrients for growth
- Previous studies conclude that excess **phosphorus** ultimately contributes to nuisance algae blooms

Phosphorus Loading

- External loading
  - Erosion from surrounding watershed during the rainy season
  - Urban stormwater, septic and fertilizer
- Internal loading
  - Summer and fall
  - Decomposing algae reduce oxygen in sediments
  - Phosphorus is released and fuels further algae growth.

Potential Sources of Erosion

- Instream channel erosion
- Stormwater runoff
- Agricultural activities
- OHV use
- Gravel mining
- Timber harvesting
- Grazing
- Wildfires

Other influences on algae

- Nitrogen
- Iron
- Food web interactions

Technical TMDL

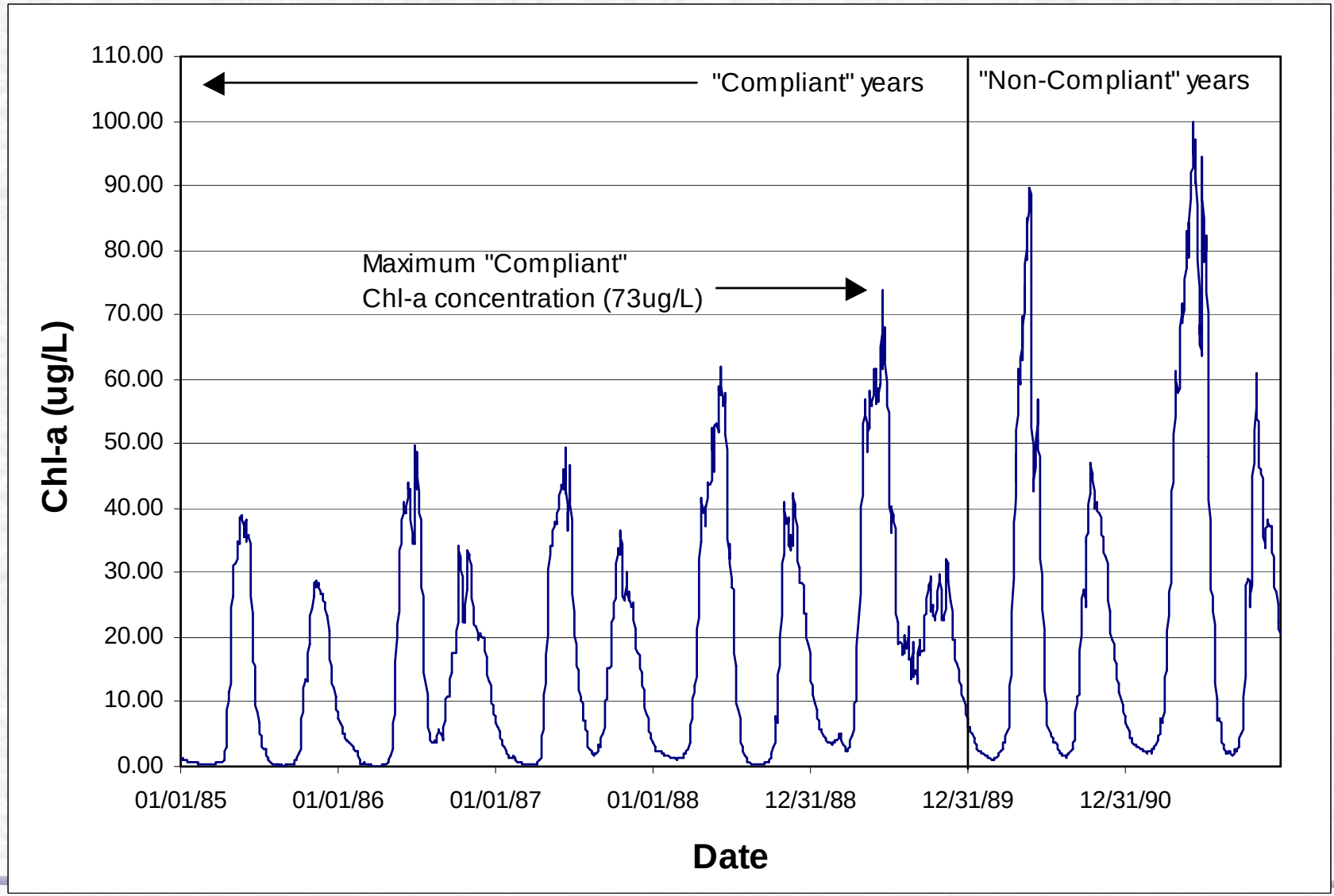
- Incorporated 30+ years of water quality data from DWR and others
- Used two computer models to model the watershed and the lake
- Developed by Tetra Tech

Watershed Model

- A watershed model that looks at land use, hydrology, rainfall and other data and calculates nutrient loads to lake

Receiving Water Model

- A receiving water model of the lake which accounts for within lake processes and simulates chlorophyll-a concentrations (surrogate for algae growth)


"Compliant" years
"Non-Compliant" years
Maximum "Compliant"
Chl-a concentration (73ug/L)
Chl-a (ug/L)
110.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
01/01/85
01/01/86
01/01/87
01/01/88
12/31/88
12/31/89
12/31/90
Date

TMDL Target =
73 μg/L chlorophyll-a

TMDL Loading Allocation = 87,100 kg P/yr

About a 40% reduction

Nonpoint Source Dischargers

- Load allocation is 85,000 kg/yr
- Responsible parties
  - Lake County
  - US Bureau of Land Management
  - US Forest Service
  - Irrigated agriculture

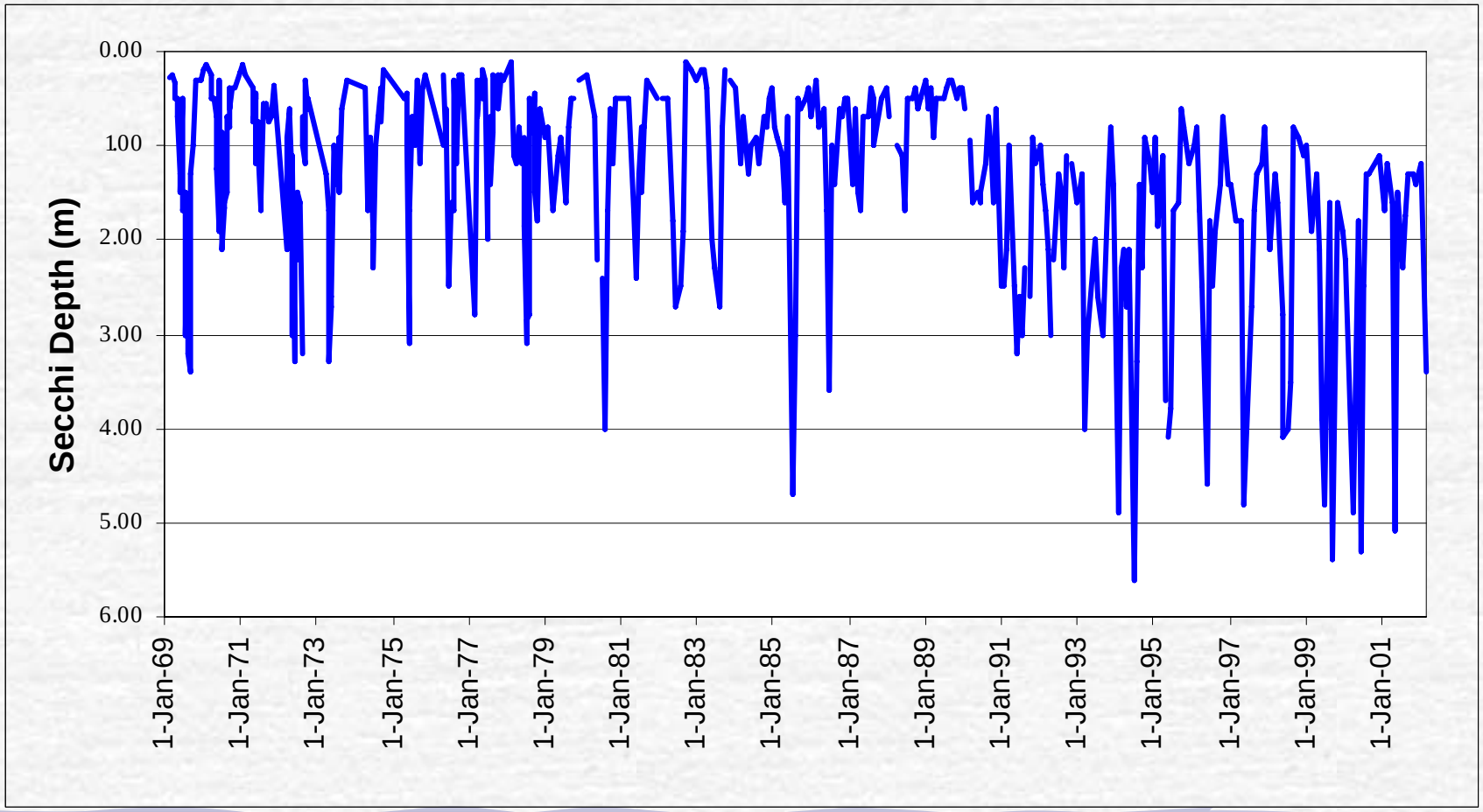
Point Source Dischargers

- NPDES Permittees
- Responsible Parties
  - Caltrans
    - Waste load allocation – 100 kg/yr
  - Stormwater permittees
    - Waste load allocation – 2,000 kg/yr

TMDL Implementation

- Existing Efforts
  - Middle Creek restoration
  - East and West Lake RCDs
  - Stormwater permits (inc. grading ordinance)
  - Timber waiver
  - Irrigated lands program
  - Water quality certification program

Recent improvements in water clarity



TMDL Implementation

- Continued Studies
- Reports
- Monitoring
- BMP Implementation

Continued Studies

- Adequacy of chlorophyll-a target and load allocations
- Update “Clean Lakes” Report
  - Role of nitrogen, iron and food web interactions
- Blue-green algae toxicity

Reports

- Due December 2011 and 2016
- Phosphorus loading estimates (computer modeling or monitoring)
- Actions implemented to control phosphorus
- Actions planned to control phosphorus
- Unpaved roads
- Grazing (USFS, BLM)
- Septic Tanks (County)

Monitoring

- Lake monitoring
- Tributary monitoring
- Effectiveness monitoring
- Irrigated lands program monitoring

BMP Implementation

- Existing efforts (described earlier)
- Further implementation activities if existing efforts are not achieving load reductions

TMDL/Basin Planning Timeline

Milestone	Estimated Date
Public Meeting	January 25th, 2006
Draft Staff Report	April 2006
Public Comment Period	April – June 2006
Regional Board Workshop	May 2006
Regional Board Hearing	June 2006
Load Reductions Achieved	2016

Questions and Discussion

Contact for further information:

Lori Webber

lwebber@waterboards.ca.gov

916-464-4745

http://www.waterboards.ca.gov/centralvalley/

Click on “Programs”, Click on “TMDL’s”, Click on “Clear Lake”